



Office of Energy Efficiency  
and Renewable Energy

# Compression-Ignition Direct-Injection (CIDI) Engine Technology

## Background

As the most efficient internal combustion engine, the CIDI engine is a leading candidate for the propulsion system in a vehicle that achieves a fuel economy of up to 80 miles per gallon — one of the goals of the Partnership for a New Generation of Vehicles. However, CIDI engines are more costly and emit more particulate and nitrogen oxide (NO<sub>x</sub>) emissions than gasoline engines.

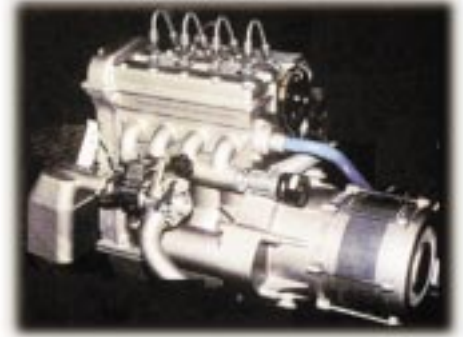
The U.S. Department of Energy's Office of Transportation Technologies is investigating several technologies critical to the success of the CIDI engine, including fuel injection, combustion processes, and methods for emission control and production cost reduction.

## Accomplishments

- ◆ A joint DOE/industry hybrid propulsion program has developed and tested two different CIDI engines. Both use advanced control systems to achieve low emissions while maintaining high efficiency.

## Benefits

- ◆ CIDI engines have the highest thermal efficiency of any proven automotive power plant.
- ◆ In a hybrid configuration, CIDI technology may deliver up to three times the fuel economy of today's gasoline engine.
- ◆ CIDI engines have the potential to meet emission standards while maintaining their advantages of reliability, high efficiency, and durability.
- ◆ Technology requires virtually no change to existing fuel infrastructure.



*Advanced CIDI Engine and Generator for a Hybrid Vehicle*

## Future Activities

- ◆ Develop advanced control technologies that also maintain high engine efficiency.
- ◆ Develop design concepts, advanced materials, and efficient manufacturing processes that render CIDI engine technology cost competitive with traditional spark-ignition engines.
- ◆ Develop modified fuels that may be needed to meet emission requirements.

## Partners in Success

Argonne National Laboratory  
DaimlerChrysler Corporation  
Ford Motor Company  
General Motors Corporation  
Lawrence Livermore National Laboratory  
Los Alamos National Laboratory  
Oak Ridge National Laboratory  
Sandia National Laboratory

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